

1 CLAIMS:

2 [1] An apparatus for injecting coiled tubing into a hole in  
3 the earth's surface comprising:

4 a frame having a front end and a back end;

5 a tubing storage spool removably mounted on said frame  
6 at said back end and having said coiled tubing  
7 stored thereon;

8 a mast pivotally mounted on said frame;

9 an injector reel rotatably mounted on said mast, said  
10 injector reel pivotable from a first stored  
11 position at said front end to a second tubing  
12 injecting position; *a*

13 a drive mechanism attached to said injector reel to  
14 rotate said injector reel; and

15 a hold down assembly mounted around a portion of the  
16 circumference of said injector reel for exerting a  
17 pressure against said coiled tubing over more than  
18 90° of said injector reel when said injector reel is  
19 in said second operative position and said coiled  
20 tubing is directed between said hold down assembly  
21 and said circumference of said injector reel to  
22 provide positive engagement of said tubing by said  
23 injector reel when said injector reel is being  
24 rotated to pull said tubing off of said tubing  
25 storage spool or return said tubing to said tubing  
26 storage spool.

1 2. The apparatus of claim 1 wherein said hold down assembly  
2 further comprises a bracket attached to said circumference of  
3 said injector reel, said bracket having an adjustment member  
4 for varying the pressure of a roller against said coiled  
5 tubing.

6 3. The apparatus of claim 1 wherein said second tubing  
7 injecting portion positions said injector reel above said back  
8 end of said frame, said mast extending generally perpendicular  
9 to said frame, and said coiled tubing exiting said apparatus  
10 generally perpendicularly to said surface.]

11 4. [The apparatus of claim 1 wherein]

12 An apparatus for injecting coiled tubing into a hole in  
13 the earth's surface comprising:

14 a frame having a front end and a back end;

15 a tubing storage spool removably mounted on said frame  
16 at said back end and having said coiled tubing  
17 stored thereon;

18 a mast pivotally mounted on said frame;

19 an injector reel rotatably mounted on said mast, said  
20 injector reel pivotable from a first stored  
21 position at said front end to a second tubing  
22 injecting position;

23 a drive mechanism attached to said injector reel to  
24 rotate said injector reel; and

25 a hold down assembly mounted around a portion of the  
26 circumference of said injector reel for exerting a  
27 pressure against said coiled tubing over more than

1 90° of said injector reel when said injector reel is  
2 in said second operative position and said coiled  
3 tubing is directed between said hold down assembly  
4 and said circumference of said injector reel to  
5 provide positive engagement of said tubing by said  
6 injector reel when said injector reel is being  
7 rotated to pull said tubing off of said tubing  
8 storage spool or return said tubing to said tubing  
9 storage spool, said second tubing injecting  
10 position positions said injector reel above said  
11 front end of said frame, and said coiled tubing  
12 exits said apparatus at an angle less than 90° to  
13 said surface.

14 5. The apparatus of claim [1] 4 further comprising a first  
15 tubing stabilizer assembly mounted within said frame and a  
16 second tubing stabilizer mounted above said hole in said  
17 surface.

18 6. The apparatus of claim [1] 4 wherein said tubing storage  
19 spool is further removably mounted to an adjustable cradle  
20 frame having opposed pivotable bullnose arms.

21 7. The apparatus of claim [1] 4 wherein said opposed  
22 pivotable bullnose arms are horizontally slidably attached to  
23 said cradle frame to accept a range of storage spool widths.

24 8. The apparatus of claim [1] 4 wherein said opposed pivotable  
25 bullnose arms are vertically slidably attached to said cradle  
26 frame to accept a range of storage spool diameters.

27 9. The apparatus of claim [1] 4 wherein said drive mechanism

1 is of adjustable length to accommodate a range of storage  
2 spool diameters.

3 [10. An apparatus for injecting coiled tubing into the earth's  
4 surface comprising:

5 a frame having a front end and a back end;

6 a tubing storage reel removably mounted on said frame  
7 and having coiled tubing stored thereon;

8 an injector reel rotatably mounted on said frame;

9 a mast pivotally mounted on said frame;

10 a drive mechanism attached to said injector reel to  
11 rotate said injector reel;

12 a multiplicity hold down mechanism mounted around a  
13 portion of the circumference of said injector reel  
14 for exerting a variable pressure against said  
15 coiled tubing when said coiled tubing is directed  
16 between said hold down assembly and said  
17 circumference of said injector reel to provide  
18 positive engagement of said tubing by said injector  
19 reel when said injector reel is being rotated to  
20 pull said tubing off of said tubing storage reel or  
21 return said tubing to said tubing storage reel,  
22 each of said hold down assembly further comprising:  
23 a bracket attached to said circumference of said  
24 injector reel, said bracket having an  
25 adjustment member for varying the pressure of  
26 a roller against said coiled tubing; and  
27 a tubing straightener mechanism attached to said

injector reel.]

11. A method of retrieving a length of coiled tubing and storing said tubing on a tubing storage spool comprising:

rotating a reel;

exerting pressure against more than 90° of the circumference of said reel while running said tubing around a portion of said circumference to exert pressure against said tubing to cause positive engagement of said tubing by said reel; and

routing said tubing off of said reel onto said tubing storage spool, said tubing storage spool mounted on a cradle vertically and horizontally adjustable to accept varying spool widths and diameters.